Section 3 Settlement Pattern Analysis

The HHCTCP City Center project corridor traverses the coastal plains of the Kona District of O‘ahu, crossing the traditional *ahupua‘a* of Kalihi, Kapālama, Nu‘uanu, Pauoa, and Makiki, with the lower shoreline portions of the latter three *ahupua‘a* comprising the modern regions of Honolulu, Kaka‘ako and Kālia. Background research provides a foundation on which to posit basic settlement patterns within each *ahupua‘a* from early post-Contact times to the Māhele land divisions during the mid-nineteenth century.

The settlement patterns displayed by these Kona *ahupua‘a* reflect the specific landscape and resources of this area. The landscape includes a combination of deep and sometimes wide valleys along with smaller, narrower valleys extending down from the Ko‘olau mountain range and opening out onto expansive coastal plains. The high rainfall of the Ko‘olau range provided abundant permanent streams and an area of rich alluvial floodplains. The coastline constituted a relatively calm and protected shoreline with scattered small harbors or bays such as Ke Awa o Kou in Nu‘uanu (the present-day Honolulu Harbor), Kuloloia in Pauoa (Honolulu), and Kewalo (the present-day Kaka‘ako area). This pattern of verdant and well-watered valleys opening onto rich alluvial floodplains and protected coastline provided excellent conditions for the development of intensive agricultural zones and marine resource cultivation.

In general, the settlement patterns of these *ahupua‘a* concentrated along the streams descending through the coastal floodplains. This settlement area extended laterally out from the streams as well as *mauka* into the wide lower valleys (Figure 54). These areas were intensely cultivated with ponded taro fields (*lo‘i*) and interspersed with scattered houses and *kula* lands (dryland or pasture). In *ahupua‘a* that possessed deep valleys, such as Kalihi and, in particular, Nu‘uanu, small concentrations of agricultural fields, gardens, and house sites were interspersed further inland along tributary streams, wider valley areas, or within side valleys. In *ahupua’a* with narrow, relatively shallow valleys, such as Pauoa and Makiki, settlement funneled narrowly inland along the streams, including taro *lo‘i*, *kula* lands, and scattered houses.

This settlement pattern fits with previous studies of settlement patterns on O‘ahu:

> The greatest percentages of each community’s agricultural lands on O‘ahu were generally on coastal plains and in lower valleys. Upper valley agricultural fields generally covered smaller areas and were not large inland systems. (Cordy 2002:46)

> In Kona, research into 1840s-1850s land records in Moanalua (Sahlins 1971, 1973), Honolulu (Ono 1992, Kolb et al. 1993), Waikīkī (Grune 1993), and Wailupe (Ogata 1992) show shore fishponds (walled-in shallow reefs or modifications of brackish swampy areas behind the sand berms), and often massive taro pondfield systems on coastal plains and lower valley areas in the large valleys of Nu‘uanu and Mānoa. Houses were dense along the shore and were scattered inland, with substantial clusters of inland houses in Waikīkī and Nu‘uanu. Drylands were placed into sweet potato, dryland taro, banana, and other cultivation. Archaeological work in Moanalua (Ayres 1970) and Kuli‘ou‘ou (Barrera 1979) also shows that fields and some scattered houses were all the way up these valleys (Cordy 2002:37).

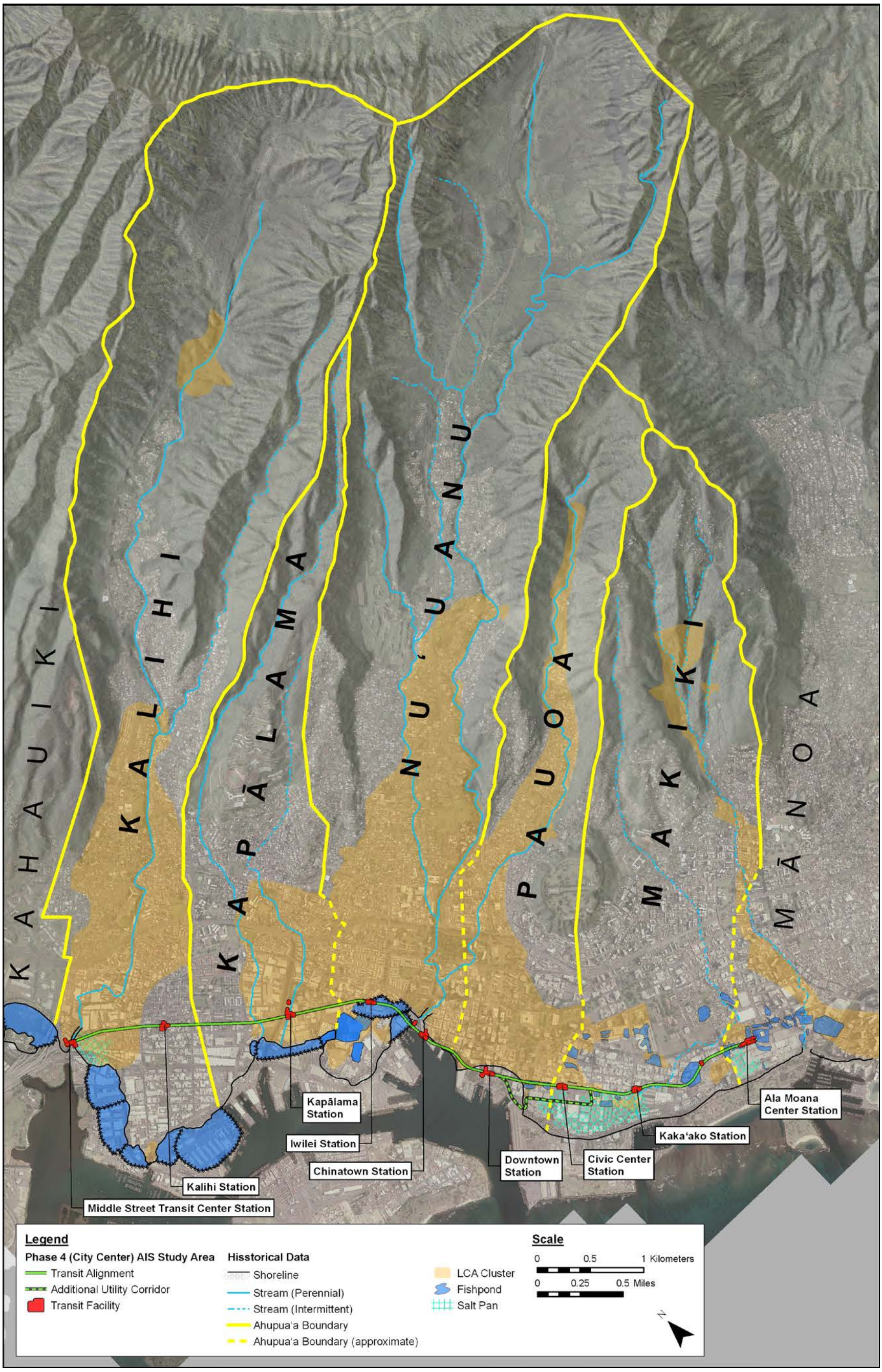

Figure 54. This aerial photograph shows the Kona *ahupua‘a* through which the HHCTCP project corridor runs: Kalihi, Kapālama, Nu‘uanu, Pauoa, Makiki and Mānoa. Māhele land awards are shown clustered primarily within the valley mouths and along the coastal plains, with less intense cultivation and settlement within the upper valleys. Of note are the coastal plains of Kapālama, Nu‘uanu, and Pauoa, which formed a virtually continuous zone of agricultural use and settlement. A string of large fishponds bordered the western *ahupua‘a* while the Kaka‘ako area contained large tracts of salt ponds and numerous ponds within the swampy coastal terrain of Makiki. (Source: U.S. Geological Survey 2005)

The shoreline area of western Kona District, as described above, contained a string of large and small fishponds for the cultivation of marine resources. In addition, many areas of coastline were utilized for the production of salt, particularly within the Kaka‘ako area (lower Makiki Ahupua‘a). House sites for fishermen and farmers, whose fields often extended very close to the shoreline, dotted the shoreline landscape.

3.1 Kalihi

Kalihi Ahupua‘a consisted of the deep and, at times, narrow Kalihi Valley along with an adjacent, much shallower side valley (Kamanaiki). The abundant mountain rains were carried down to the coastal floodplain via the perennial Kalihi Stream and the intermittent Kamanaiki Stream, which joined the larger Kalihi Stream at the mouth of Kalihi Valley (Figure 55). The rich alluvial coastal plains, watered by the mountain streams, provided favorable conditions for the cultivation of wetland taro as well as other crops. Early historic accounts of Kalihi (see Section 2.1.1) described a richly cultivated plain of taro fields with scattered habitations stretching from the lower plain up to the mouth of Kalihi Valley. Kalihi Valley then narrowed before widening slightly again near its head.

A study of various LCAs granted within Kalihi Ahupua‘a during the mid-nineteenth century Māhele showed a concentration of taro fields extending laterally from Kalihi Stream throughout the coastal plain area and up into the lower valley (Figure 55, Figure 56, Figure 57, and Table 6). Scattered habitation was interspersed throughout this zone. In areas furthest from the stream, such as at the base of the ridge in the *‘ili* of Kaluaopalena, *kula* lands appeared more frequently amidst the continuing *lo‘i* claims (Figure 55, Table 6). Within central and upper Kalihi Valley, very few *kuleana* awards were documented. The majority of land claims in the valley were awarded as large parcels to royalty, chiefs, or Westerners (Figure 56). However, a small cluster of *kuleana* claims consisting of *lo‘i*, house lots, *kula*, and gardens (oranges, bananas, breadfruit, *hala*, and lemon) was located near the valley head (Table 6, Vol. III). This broad analysis of LCA claims and settlement pattern corresponds with previous studies:

> On the flatlands, below the valley there were extensive terraces on both sides of the stream, while along the stream in the lower valley there were numerous areas with small terraces. The interior of the valley was rough and narrow and not suitable for *lo‘i*, but it would have been good for sweet potatoes, yams, wauke, and bananas which probably were planted there. (Handy and Handy 1972:465)

Along the Kalihi coastline (in the vicinity of the transit corridor) the majority of LCAs were large claims that lacked land use descriptions or locational specifics, such as clarification of the land use of various *‘āpana* (see Section 2.1.2, Figure 9, and Table 1). However, land use descriptions for LCA 818 awarded to George Beckley did specify fishing grounds. Additionally, salt was harvested on lands just east of Kalihi Stream (see Section 2.1.2). The cultivation of marine resources in the coastal area is further documented within LCA 2710 *(‘āpana* 5), which claimed one house lot and two pools for “liberating fish.” The five fishponds strung along almost the entire shoreline also indicate the rich marine resources of the *ahupua‘a*. Land use of the coastal area further consisted of at least scattered house lots and farming as indicated by LCA 5011 *(‘āpana* 5), located just *mauka* of Loko Apili, which contained “farming land,” and LCA 7234, located between Loko Pahouiki and Loko Auiki, which contained one house lot. Thus, the coastal settlement pattern appeared to include a mix marine resource cultivation, houses, and farm land.

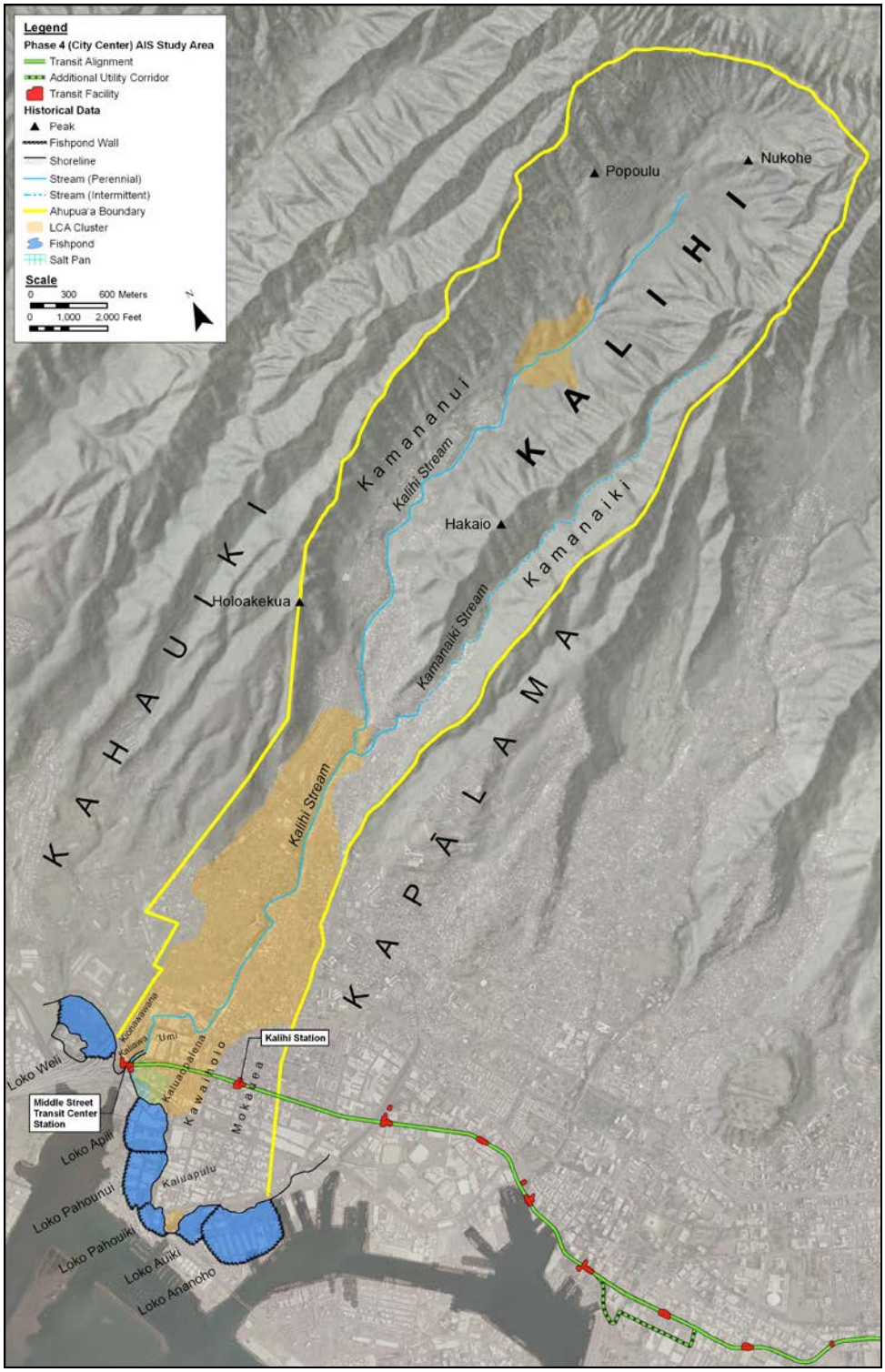

Figure 55. This aerial photograph shows Kalihi Ahupua‘a, including: the *ahupua‘a* boundaries, major streams, areas of concentrated *kuleana* LCAs, coastal fishponds, and the location of several large *‘ili*. Note the large concentration of LCAs within the coastal floodplains along Kalihi Stream as well as the small cluster of *kuleana* awards in the far uplands of the valley. (Source: U.S. Geological Survey 2005)

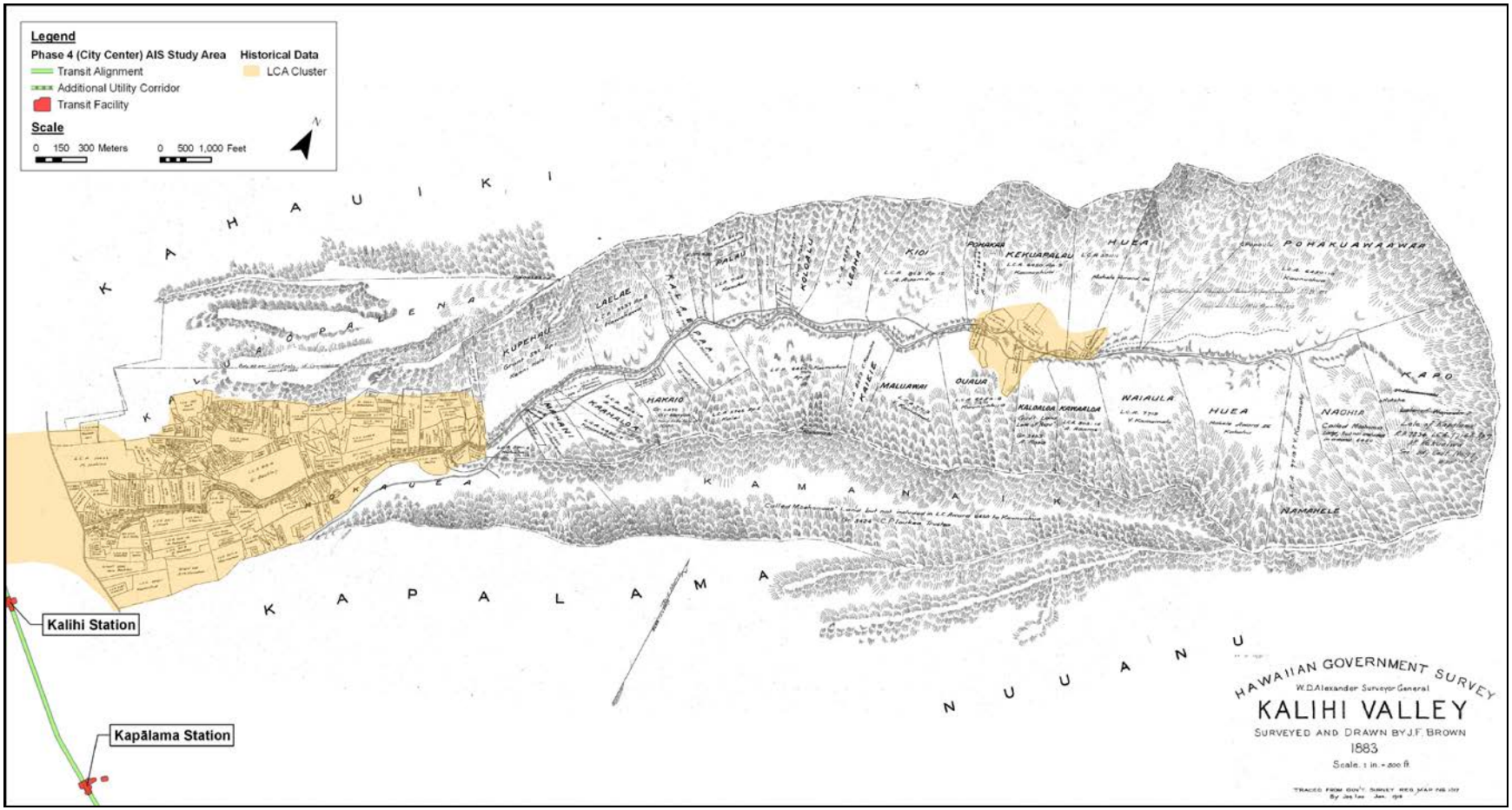

Figure 56. 1883 J. F. Brown survey map showing Kalihi Valley and areas of concentrated *kuleana* LCAs (Brown 1883a). Note the contiguous area of LCAs extending from the mouth of Kalihi Valley toward the coast and the discrete cluster of LCAs in the valley uplands.

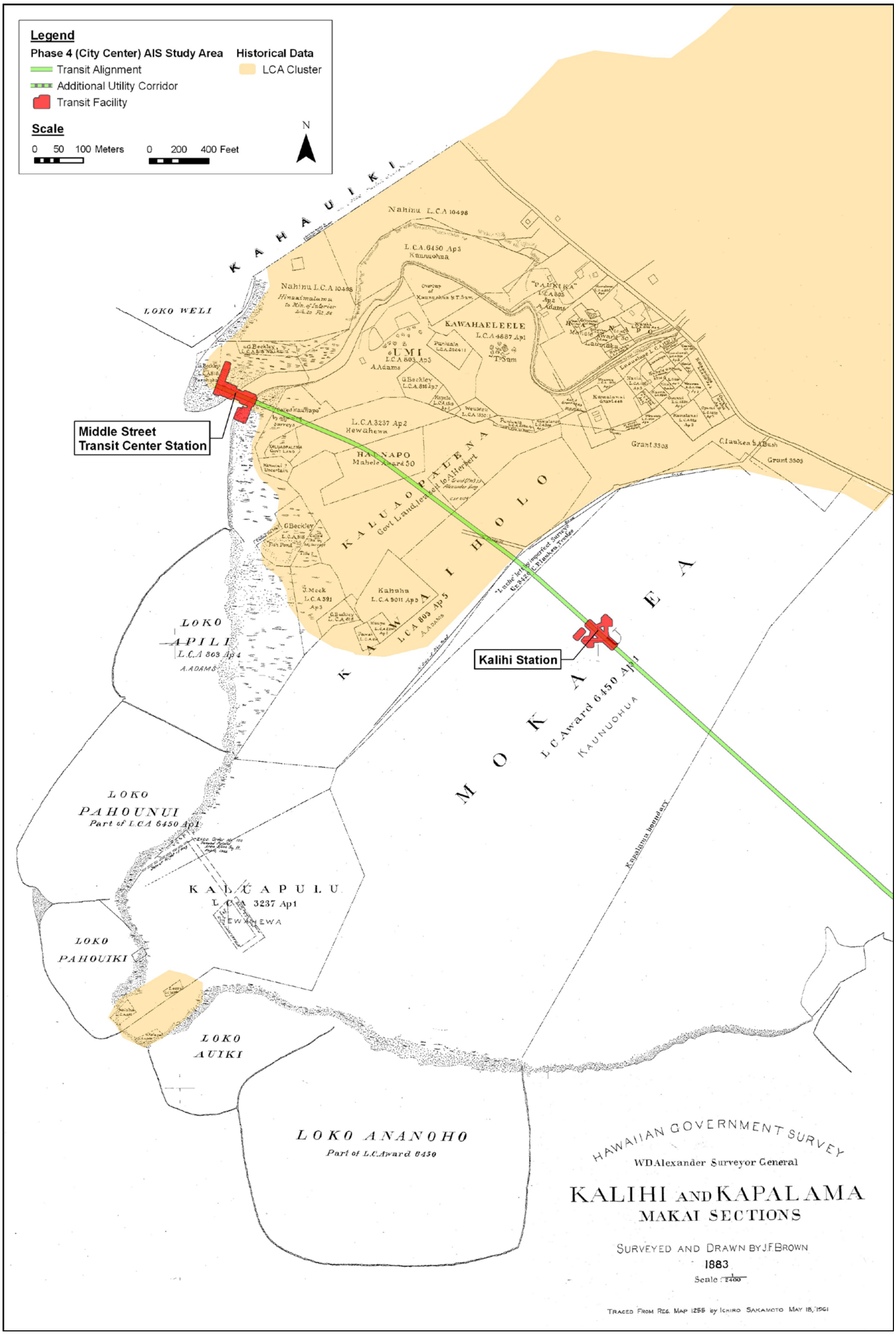

Figure 57. This close-up of the 1883 J. F. Brown survey map (Brown 1883b) shows the mouth of Kalihi Stream, the concentration of LCAs accompanying the stream into the lower floodplain, and a small cluster of LCAs on the shoreline amidst a string of fishponds. Note that the *‘ili* of Mokauea does not document any *kuleana* awards; however, *lo‘i* certainly existed in this area as well (as indicated by land claim descriptions for LCAs 7175 and 1255).

Table 6. Sampling of LCA Claims Within Kalihi Ahupua‘a

LCA	Claimant	Description	Area
926	Kamalanai	Sixteen *lo’i, kula* (five *‘āpana*)	Lower coastal plain
1530	Weuweu	Fifteen *lo‘i*, one house lot, one *kula* (four *‘āpana*)	Lower coastal plain
1531	Laauolupe	Four *lo‘i* (two *‘āpana*)	Lower coastal plain
2324	Puniuala	Seven *lo’i* (two *‘āpana*)	Lower coastal plain
11229	Opunui	Three *lo‘i* (two *‘āpana*)	Lower coastal plain
2296		Nine *lo‘i*, one house lot, *kula*	Central plain
1238	Hoenui	Eight *lo‘i*, one house lot (three *‘āpana*)	Central plain; below ridge (valley mouth)
1261	Kinopu	Three *lo‘i*, one pasture (two ‘āpana)	Valley mouth, below ridge
1214:2	Kana	Seven *lo‘i*	Valley mouth, below ridge
1202	Manini	Seven *lo‘i*, one *kula*, one house lot (two *‘āpana*)	Valley mouth, below ridge
85 FL	Uweloa	Six *lo‘i* cultivated *kula*, one house lot	Valley mouth, below ridge
1397	Kawaha	Six *lo‘i*, one house lot (within two *‘āpana*); sweet potato land [also claimed six *lo‘i* in upland Kalihi]	Valley mouth along stream; uphill from stream
1256	Naihe	Twelve *lo‘i*	Valley mouth along stream
1049	Keawepoepoe	Two *lo‘i*, one house lot, two *hala*, two oranges, lemon (two *‘āpana*)	Upland Kalihi Valley
7175	Kapule	Eleven *lo‘i*, one house lot, one *hala*, bananas, breadfruit, oranges (three *‘āpana*) [*lo‘i* also claimed in Mokauea *‘ili*]	Upland Kalihi Valley
Unknown	Naai	Cultivated [referred to in LCA 1049; husband of claimant]	Upland Kalihi Valley
1255	Waialua	Taro land in Kalihi uka (claimed); three houses and nine *lo‘i* in Mokauea *‘ili*	Upland Kalihi Valley; lower coastal plain
2710	Haupu	Five *lo‘i*, one sweet potato patch (*‘āpana* 1, 2); one house lot and two pools for “liberating fish” (*‘āpana* 5)	Lower coastal plain; near shoreline
5011	Kahaha	“Farming land”	Near shoreline
7234	Leonui	One house lot; five *lo‘i*	Near shoreline; lower coastal plain near Makauea

3.2 Kapālama

Located between the two major river valleys of Kalihi and Nu‘uanu, Kapālama Ahupua‘a consisted primarily of a long finger ridge descending from the Ko‘olau summit and a broad alluvial floodplain (Figure 58). Although Kapālama lacked an interior valley, its smaller, elevated valleys cutting down the ridgeline brought abundant stream waters to the coastal lands via two perennial streams, Kapālama and Niuhelewai. The shoreline consisted of a protected stretch of coastal waters. As in Kalihi, the rich alluvial floodplains and protected shoreline would have provided favorable conditions for the cultivation of taro and the development of fishponds. The settlement patterns of the two *ahupua‘a* reflect this similarity.

According to an 1855 map by La Passe, an extensive taro *lo‘i* system was developed along the central and lower plains of Kapālama (see Figure 10). This is also supported by the research of E.S. Craighill Handy who gathered information from local residents in the 1930s and 1940s:

> Kapalama had two streams watering its terrace area [for taro], which was almost continuous from Iwilei up to the foothills above School Street, an area measuring about three quarters of a mile both in depth inland and in breadth. (Handy 1940:79)

LCA research confirms this agricultural pattern, showing an intense area of taro cultivation interspersed with scattered houses as well as some *kula* lands and fishponds (see Figure 12, Figure 13 and Figure 59). LCAs within the vicinity of the transit corridor, which traverses the lower portion of coastal plain, document primarily taro *lo‘i* and house lots, which extended virtually down to the shoreline (see Figure 13, Table 2, and Vol. III). LCAs just *mauka* of the project corridor document similar land use with the addition of several small fishpond claims (O’Hare et al. 2010).

As in Kalihi, the shoreline of Kapālama consisted of large fishponds: Loko Kūwili and Loko Kapukai. Fishermen’s houses were likely scattered along the coastline as well, as indicated by the 1855 La Passe map (see Figure 10) and described by a Dutch merchant, who states, “we arrived at the beach and came upon a small hamlet of several scattered fishermen’s huts” (Broeze 1988:69).

Thus, the general settlement pattern evident within the coastal area of Kapālama Ahupua‘a, between Kapālama and Niuhelewai Streams, showed great similarity to the settlement pattern displayed within Kalihi Ahupua‘a. Shoreline fishponds and fishermen’s habitation transformed immediately into a broad plain of taro *lo‘i* watered by large streams and containing scattered habitation, *kula* lands, and fishponds. Because Kapālama lacked an extensive valley in the interior it did not appear to develop upland areas of concentrated cultivation.

However, it may be noted that coastal west Kapālama was different. Central coastal Kapālama between Kapālama and Niuhelewai Streams was a patchwork of *lo‘i* and habitations, but the bedrock ridge west of the Kapālama Stream bottom lands (Figure 58 and Figure 59) appears to have been sparsely utilized. In 1855, La Passe (see Figure 10) drew a sharp distinction between these desolate western lands that he called the Plain of Kalihi (“*Plaine de Kalihi”*) and the verdant fields of *kalo* (“*Champs de Taro”*) to the east. A ridge of shallow and exposed bedrock effectively separated the core habitation and agricultural lands of coastal Kalihi (Figure 55 and Figure 56) and the core habitation and agricultural lands of coastal Kapālama (Figure 58 and Figure 59).

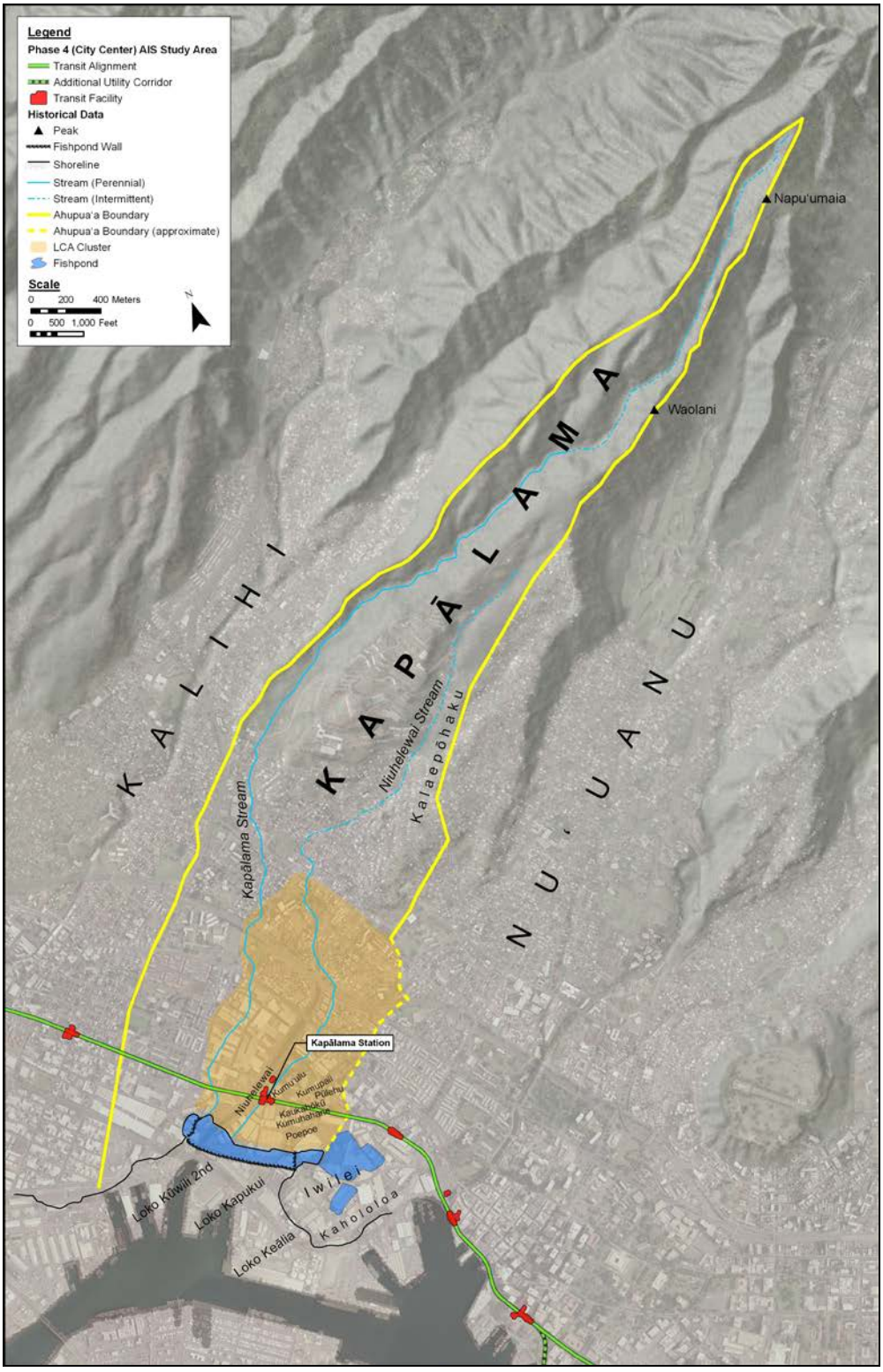

Figure 58. Aerial photograph showing Kapālama Ahupua‘a, including: the *ahupua‘a* boundaries, Kapālama and Niuhelewai Streams, an area of concentrated *kuleana* LCAs within the coastal floodplain, and coastal fishponds (Source: U.S. Geological Survey 2005).

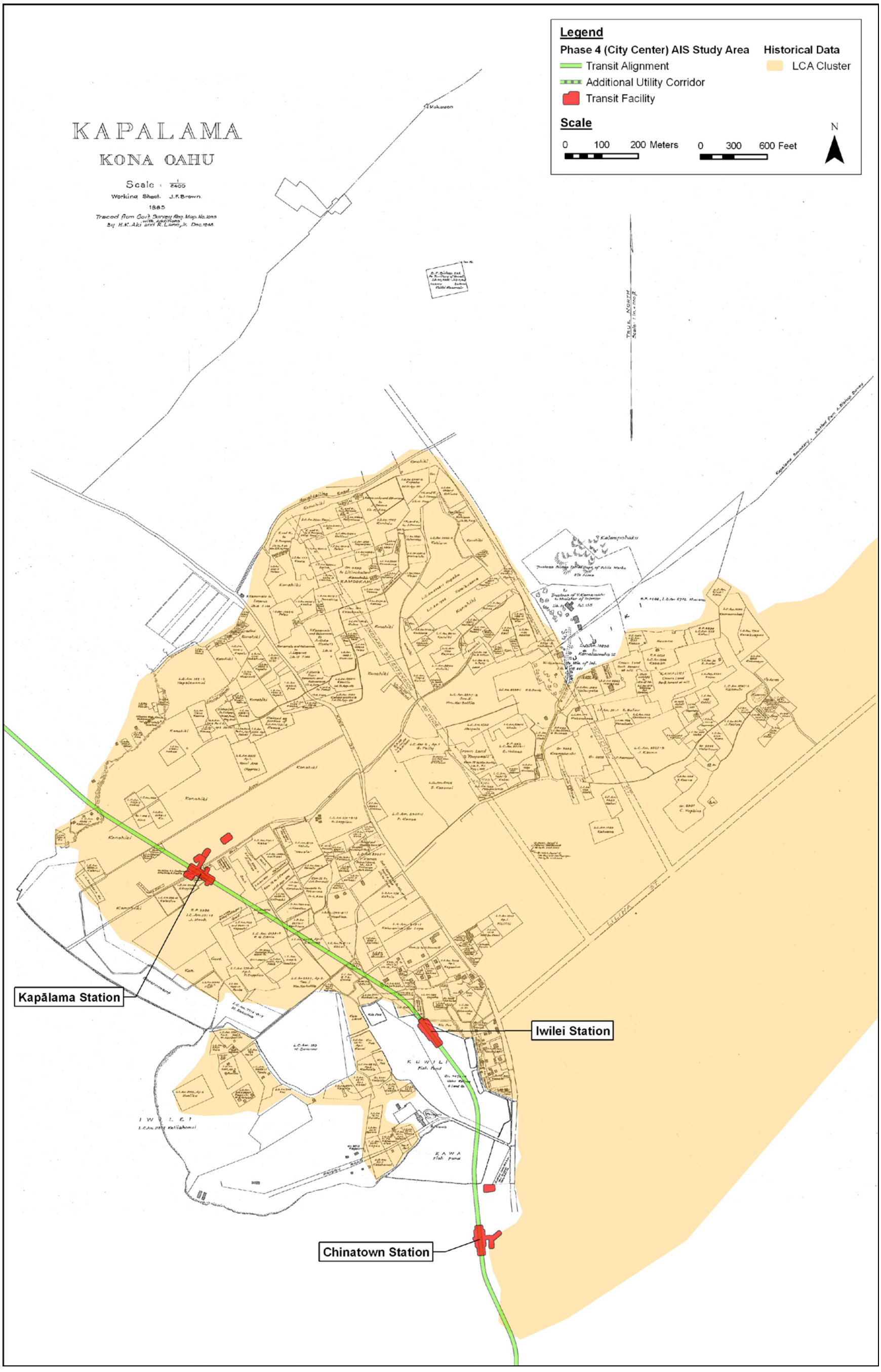

Figure 59. This close-up of 1885 J. F. Brown survey map shows the concentration of *kuleana* LCAs on the coastal plains between Kapālama and Niuhelewai Streams and extending eastwards from Niuhelewai Stream. West coastal Kalihi appears to have had little habitation or agriculture.

3.3 Nu‘uanu

Nu‘uanu Ahupua‘a consisted of one of the largest valleys within the Kona District. The valley floor was wide and relatively flat due both to a late volcanic eruption at the head of the valley and to the heavy rains captured by Kōnāhuanui, the highest peak in the Ko‘olau range. Several smaller side valleys also splintered out from the main valley, the most prominent and famous of these being Waolani Valley. The abundant rainfall of this area of the island resulted in two major streams, Nu‘uanu and Waolani, as well as several feeder streams, including Lulumahu Stream (Figure 60). The alluvial coastal floodplain extended down from the mouth of the valley to a protected bay, Ke Awa o Kou (now known as Honolulu Harbor).

The Hawaiian historian Samuel Kamakau further described the settlement and cultivation of upper Nu‘uanu Valley:

> It is said that from Kahapa‘akai clear to Hapu‘u it was in old days a beautiful highway through charming villages with manienie grass on either side of the road and garden patches where grew taro, potatoes, bananas, awa, wauke, sugarcane, olona and all the fat things of the land. (Sterling and Summer 1978:305-306)

From these descriptions, the traditional settlement pattern of Nu‘uanu Ahupua‘a at the time of Western contact appears to have been similar to that displayed within Kalihi: a shoreline area of fishponds and salt production backed by extensive fields of wetland taro interspersed with *kula* lands and houses. However, due to the particularly wide and watered landscape of Nu‘uanu, the upper reaches of the valley and the side valleys were more intensely cultivated than the narrower Kalihi Valley. According to E.S. Craighill Handy, the side valleys of Nu‘uanu were utilized for taro *lo‘i* or gardens:

> In upper Nuuanu there are many small valleys which open into the main valley on either side of the stream. Traces of ancient terraces have been discovered in several valleys on the steep slopes above the stream beds, below the falls, and on small flat areas along the sides of streams. Probably all these small valleys were used for planting taro in ancient times; Luakaha doubtless had many inland gardens; but there were no wet terraces that far up. In the DowsettTract below Nuuanu Stream there were formerly terraces.

How far terraces extended up Waolani, in Oahu Country Club area, is difficult to determine:

> According to Mr. A.F. Judd there are traces of terraces on land now cultivated by a dairy. From Waolani to Kapalama the terraces were continuous on the level and gently sloping land between the Nuuanu and Waolani streams, past Wyllie and Judd Streets and throughout the section on the north side of the valley, down what is now Liliha Street. (Sterling and Summers 1978:293-295)

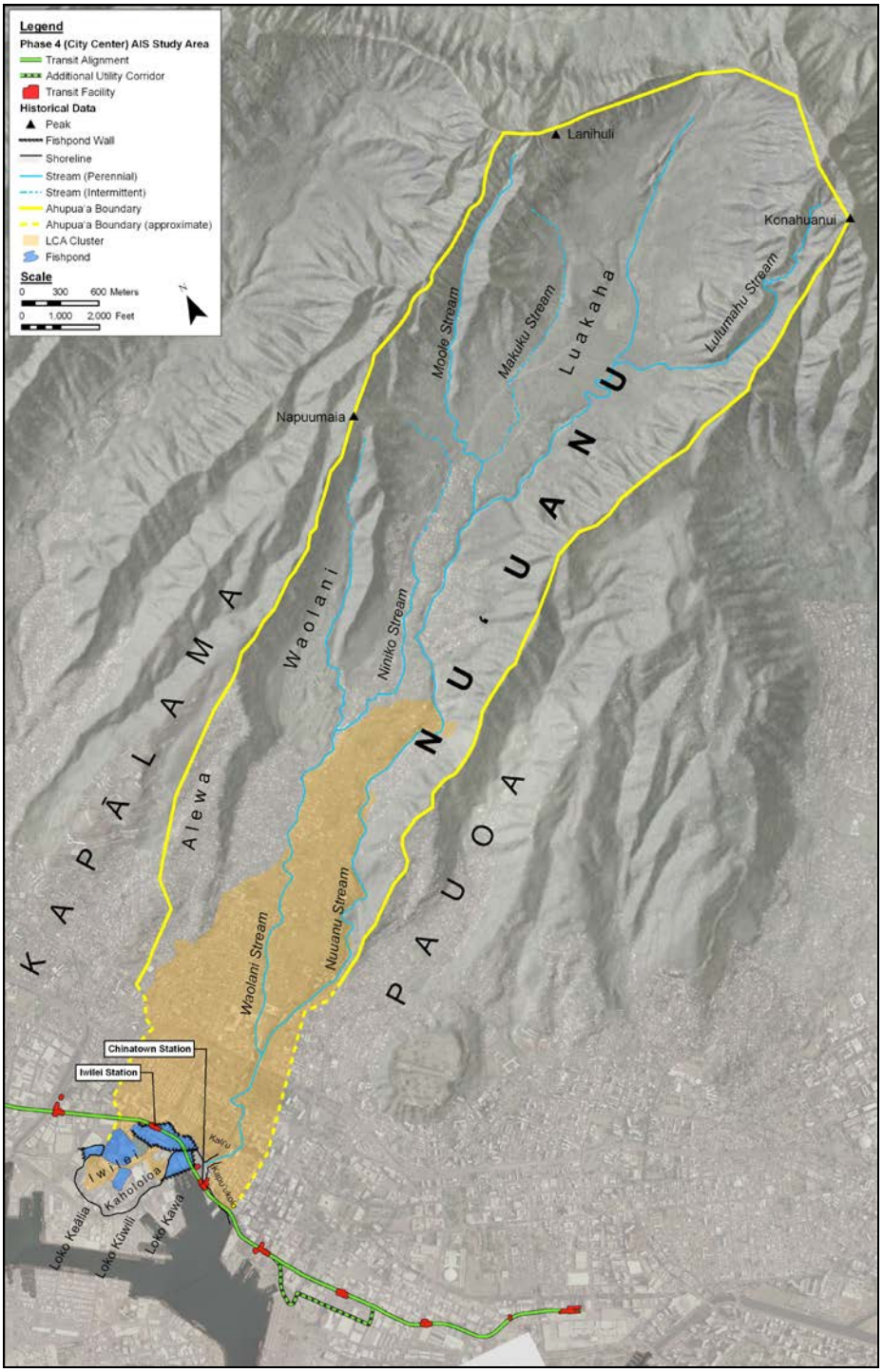

Figure 60. This aerial photograph shows Nu‘uanu Ahupua‘a, including: the *ahupua‘a* boundaries; Nu‘uanu and Waolani Streams, along with several feeder streams; an area of concentrated *kuleana* LCAs within lower Nu‘uanu Valley, extending down from the area of Pū‘iwa and across the coastal floodplain to the shoreline; coastal fishponds; and a cluster of LCAs in the vicinity of Iwilei. (Source: U.S. Geological Survey 2005)

Māhele LCA documentation additionally reflects the heavy land use and settlement pattern of Nu‘uanu Ahupua‘a. Figure 61 through Figure 63 show continuous LCAs between Pū‘iwa in upper Nu‘uanu Valley down to King Street. While the lower coastal area in the vicinity of King Street includes the urban growth of Honolulu town and harbor with commercial buildings amidst residential lots (Figure 63), the upper plains and lower valley still reflect a more traditional settlement pattern of taro *lo‘i* and house lots (Figure 61 and Figure 62).

Along the shoreline of Nu‘uanu Ahupua‘a, the pre-Contact settlement pattern likely resembled that of Kalihi Ahupua‘a with scattered houses, *lo‘i, kula* lands, and fishponds. Within the small peninsula of Iwilei to the west, which was considered part of Nu‘uanu Ahupua‘a rather than Kapālama Ahupua‘a, this appears to have been the case, showing large fishponds, scattered houses, *lo‘i, kula* lands, and *ki‘o pua* (pools for stocking young fish) dotting the shoreline area (see Figure 24 and Vol. III). However, within the shoreline area to the east, comprising the present-day Chinatown and Downtown Honolulu, land use patterns had evolved significantly by the time of the Māhele land division as a consequence of the importance of Honolulu Harbor and the development of the capital city. The LCAs documented within the vicinity of the project corridor consisted almost entirely of house lots (see Figure 23 and Table 3).

3.4 Pauoa

Pauoa Ahupua‘a consisted of a shallow valley which extended down a split in the ridgeline descending from the summit peak of Kōnāhuanui. Pauoa Valley then opened onto the rich alluvial coastal plain contiguous with the *ahupua‘a* of Nu‘uanu. Although relatively small and narrow, Pauoa Valley contained abundant water resources in the form of numerous springs which fed into Pauoa Stream. As Pauoa Stream descended the valley, it encountered the backside of Punchbowl Crater (Pūowaina), which caused it to veer west until it joined Nu‘uanu Stream shortly before it reached the ocean (Figure 64).

According to the research of E.S. Craighill Handy, the settlement pattern within Pauoa Ahupua‘a consisted of a dense expanse of taro fields within the coastal plain and lower valley along with rich sweet potato fields on the slopes of Pūowaina:

> The flatland in the bottom of Pauoa Valley above Punchbowl was completely developed in terraces…Below Punchbowl, between Pacific Heights and King Street, there must have been more or less continuous terraces on the ground now covered by the city. (Sterling and Summers 1978:291)

> Punchbowl Crater (Puowaina), on both the inner and outer slopes, was also famous in ancient times as a sweet potato locality. The planting was especially good on the inland side near the present Hawaiian homestead of Papakolea. (Sterling and Summers 1978:292)

LCA documentation supports this depiction of a narrow but highly fertile and intensely cultivated valley. Figure 65 through Figure 68 show an area of continuous *kuleana* awards extending from the backside of Punchbowl Crater up along the valley floor until it begins to ascend more steeply at the back of the valley. Taro fields cluster along the stream with *kula* lands occupying the sloping outer edges of the valley and house sites scattered throughout. Several springs are noted along Pauoa Stream (Figure 66). This settlement pattern of clustered taro *lo‘i*

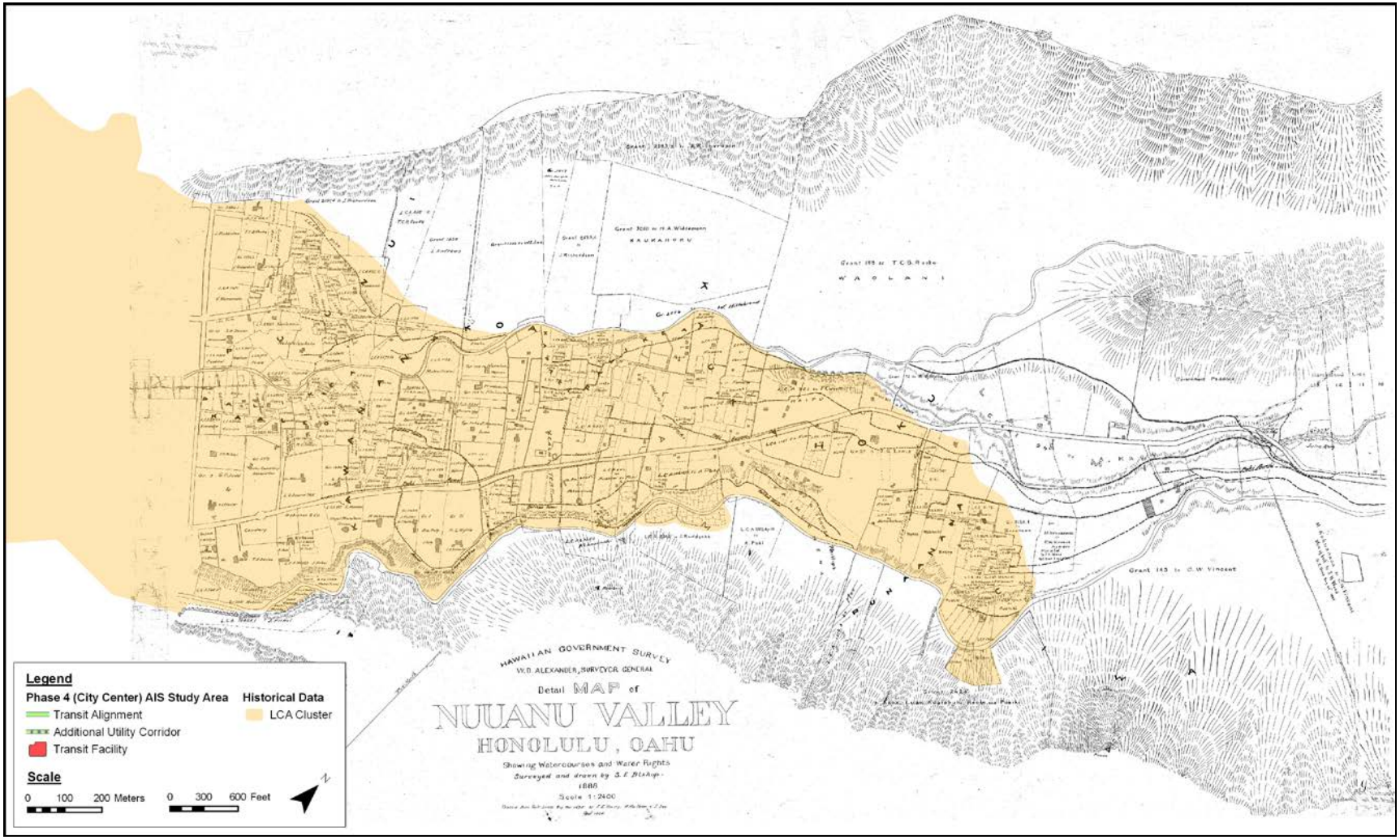

Figure 61. This 1888 W. D. Alexander survey map shows *kuleana* awards granted within lower Nu‘uanu Valley and extensive systems of *‘auwai* (irrigation canals). The map indicates that the entirety of Waolani Valley consisted of Grant 168 to T.C.B. Rooke; according to the land use pattern described by E.S. Handy (see above discussion), this area also contained *lo‘i* terracing.

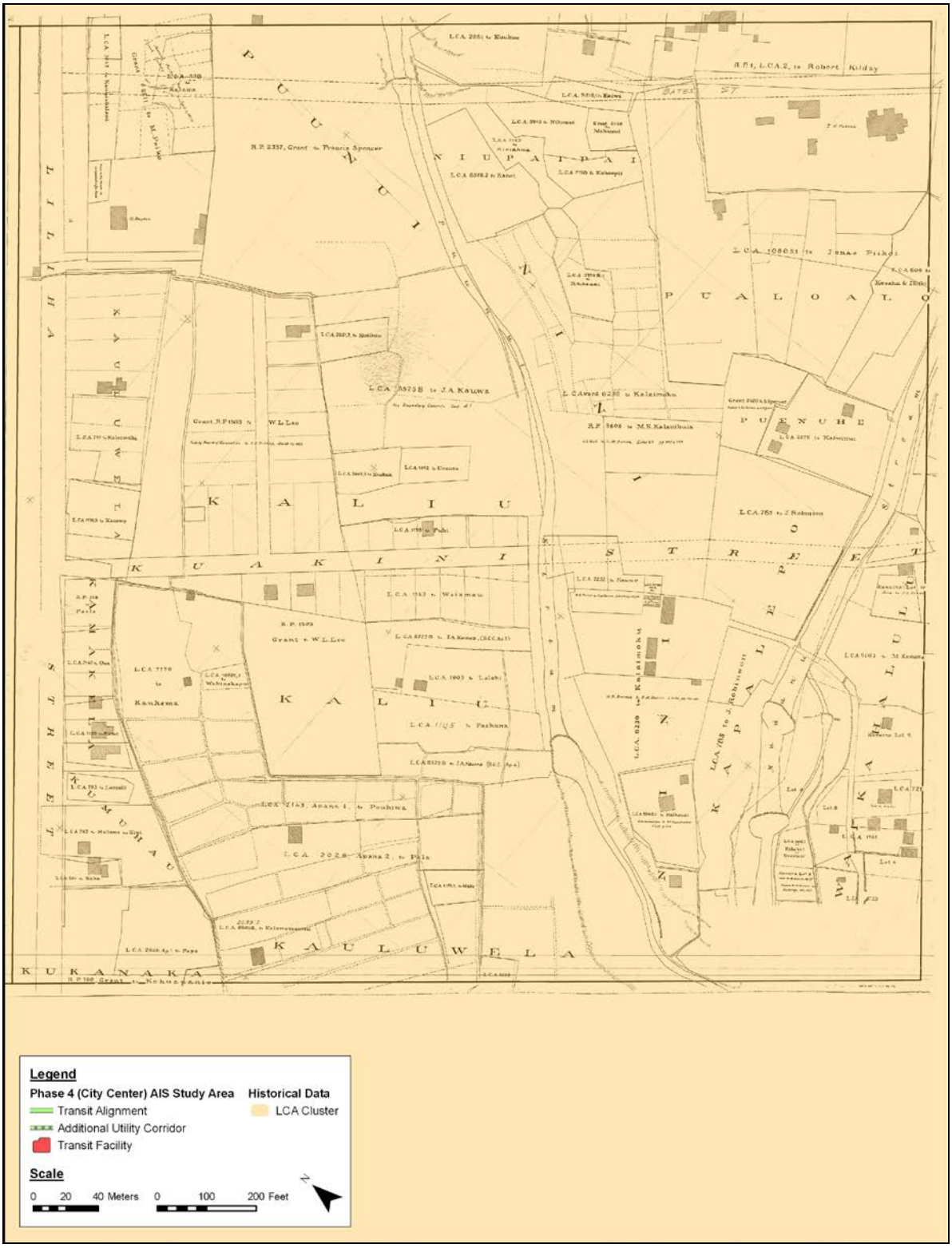

Figure 62. 1890 S. E. Bishop survey map (Reg. Map 1532) showing Māhele land awards and scattered houses within the upper coastal plains of Nu‘uanu, between Bates and School Streets

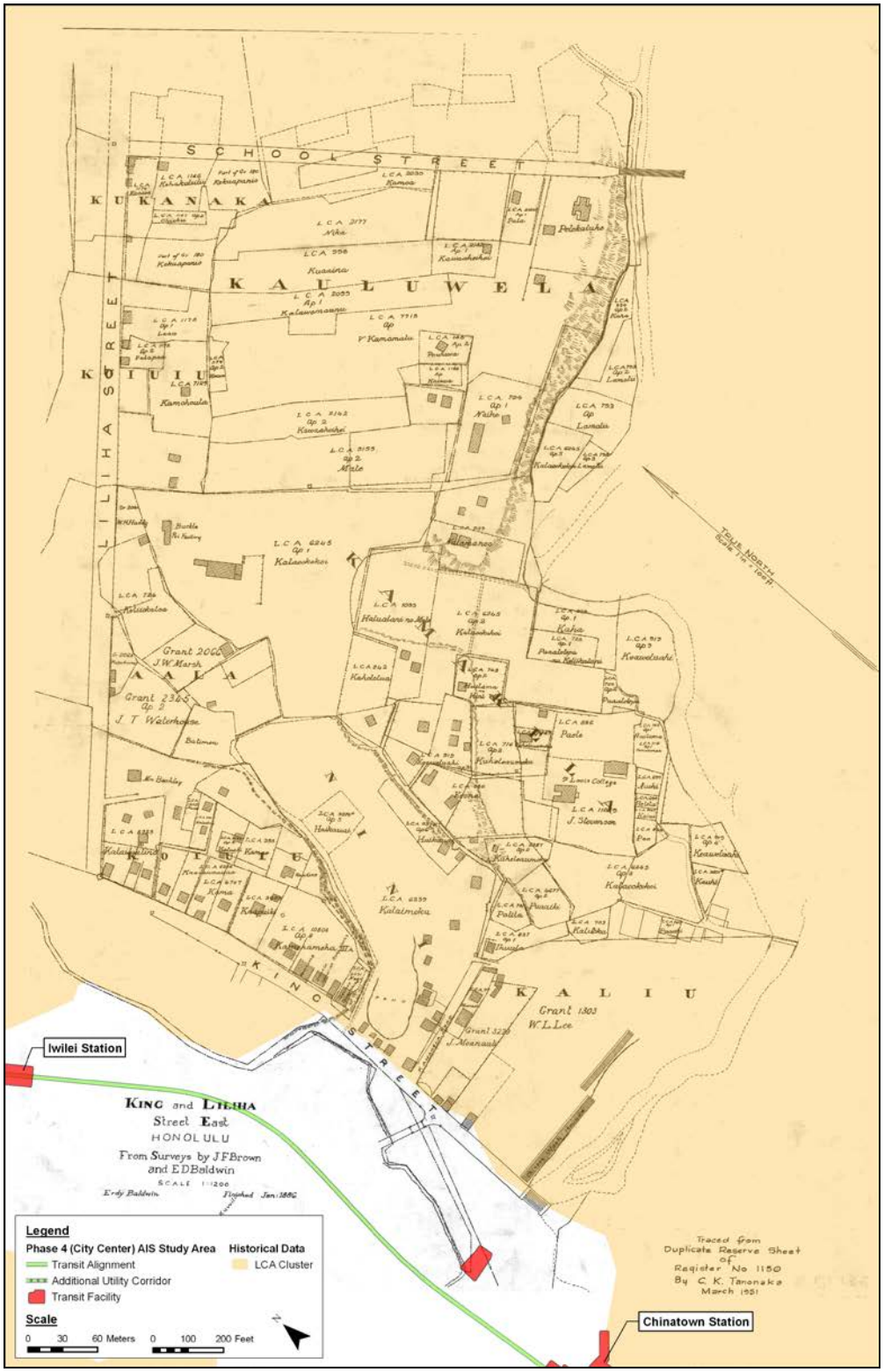

Figure 63. 1886 J. F. Brown and E.D. Baldwin survey map (Reg. Map 1150) showing Māhele land awards and houses or commercial structures within the lower coastal plains of Nu‘uanu Ahupua‘a

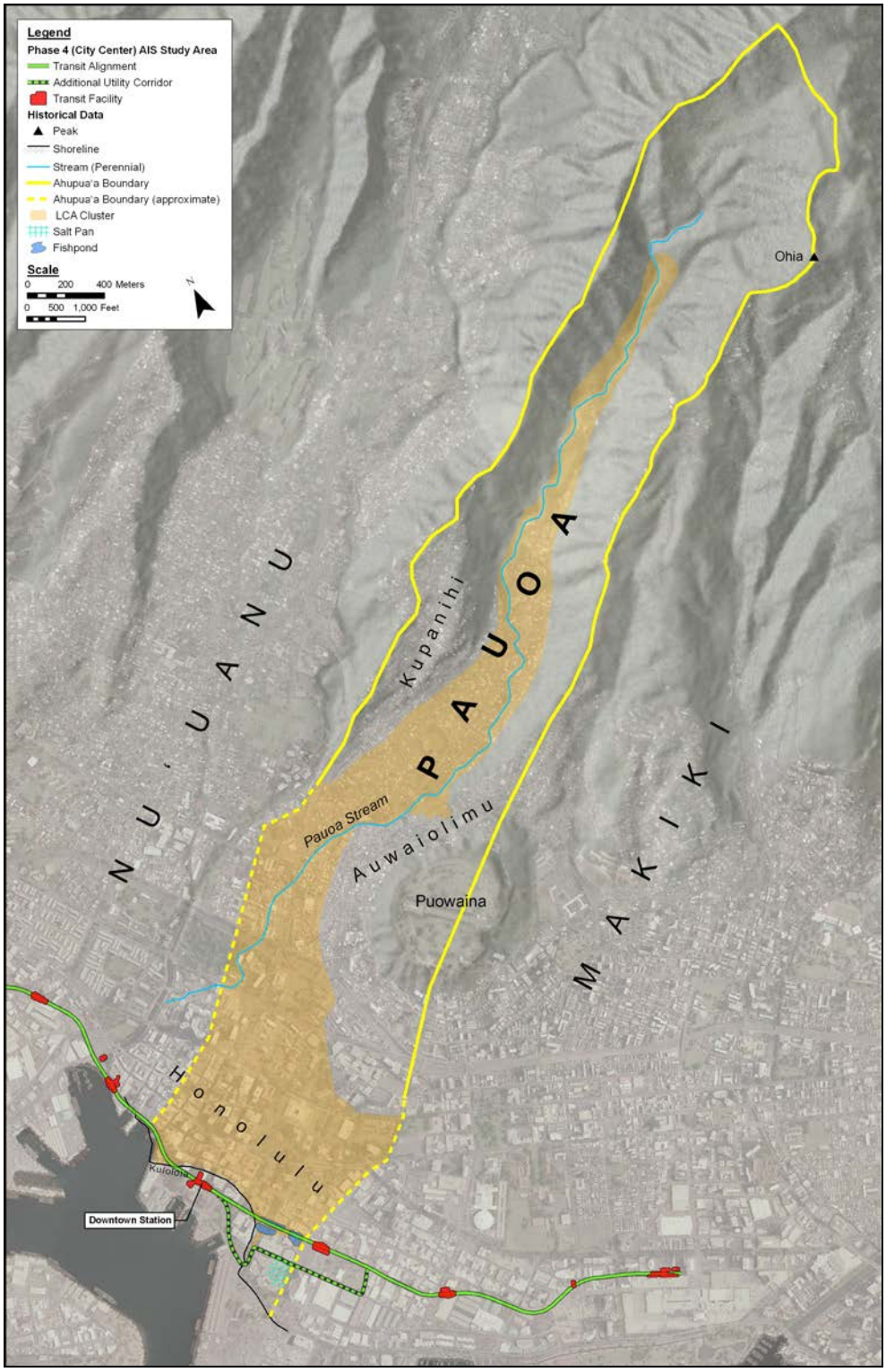

Figure 64. Aerial photograph showing Pauoa Ahupua‘a, including: the *ahupua‘a* boundaries, Pauoa Stream, and a continuous cluster of LCAs stretching from near the shoreline to deep within the narrow finger of Pauoa Valley (Source: U.S. Geological Survey 2005)

Figure 65. This 1913 survey map by M.D. Monsarrat and H.E. Newton shows LCAs within the upper portion of Pauoa Valley. Note the almost continuous taro lands along the stream, *kula* lands sloping up the ridges, scattered house sites, and three springs in the area furthest up valley.

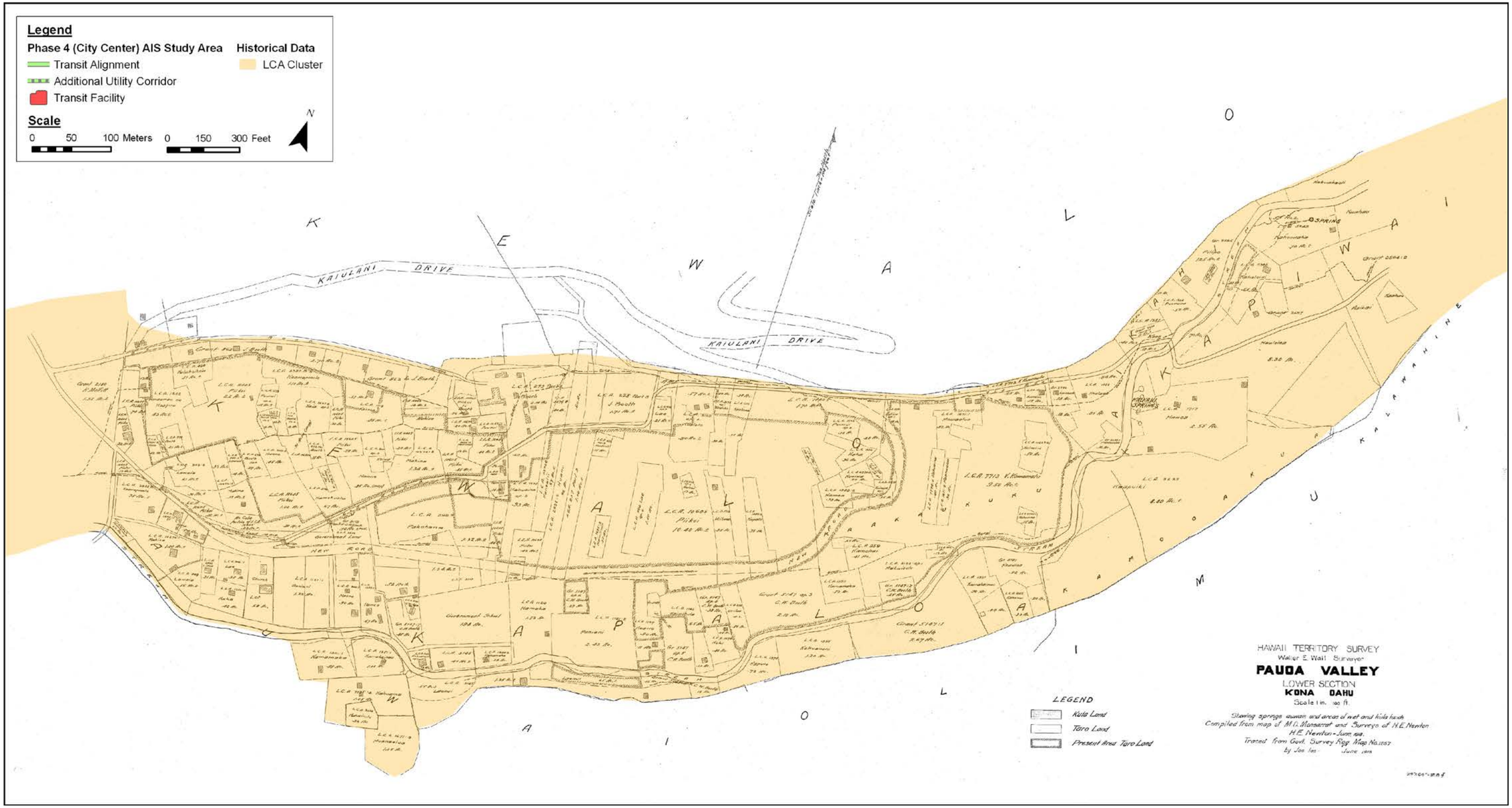

Figure 66. This 1913 map by M.D. Monsarrat and H.E. Newton shows LCAs within the lower portion of Pauoa Valley just *mauka* of Punchbowl Crater. The map details scattered house sites amidst extensive wetland taro fields. Two springs are also indicated within the northern, upland portion of the map.

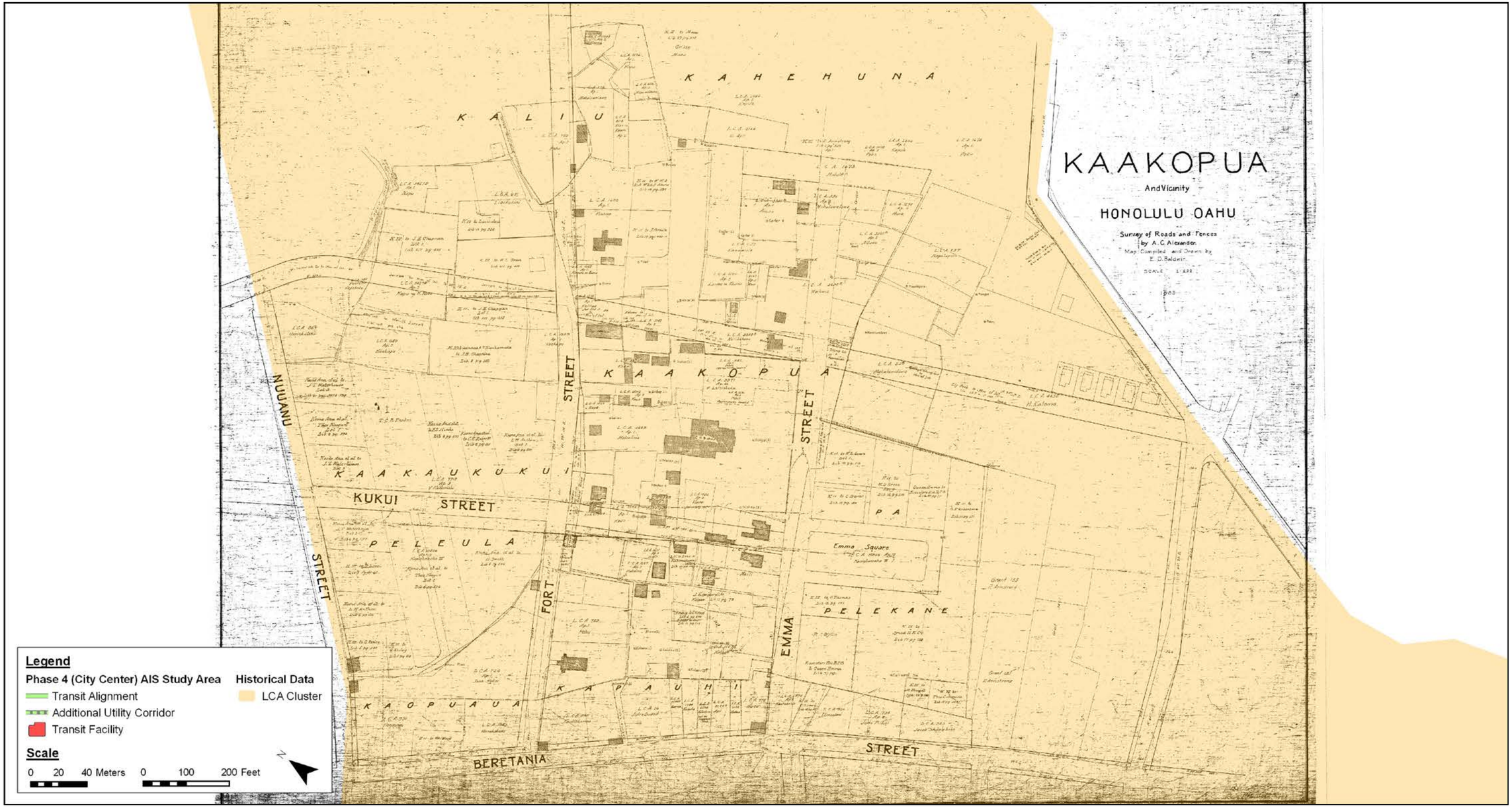

Figure 67. This 1885 A. C. Alexander survey map (Reg. Map 1389) shows LCAs within Pauoa Ahupua‘a in the area just north of Beretania Street. Note the numerous large LCAs awarded to royalty, *ali‘i,* and Westerners. The map also shows many large urban structures, such as a gymnasium and Chinese Church, reflecting the urban growth of Honolulu.

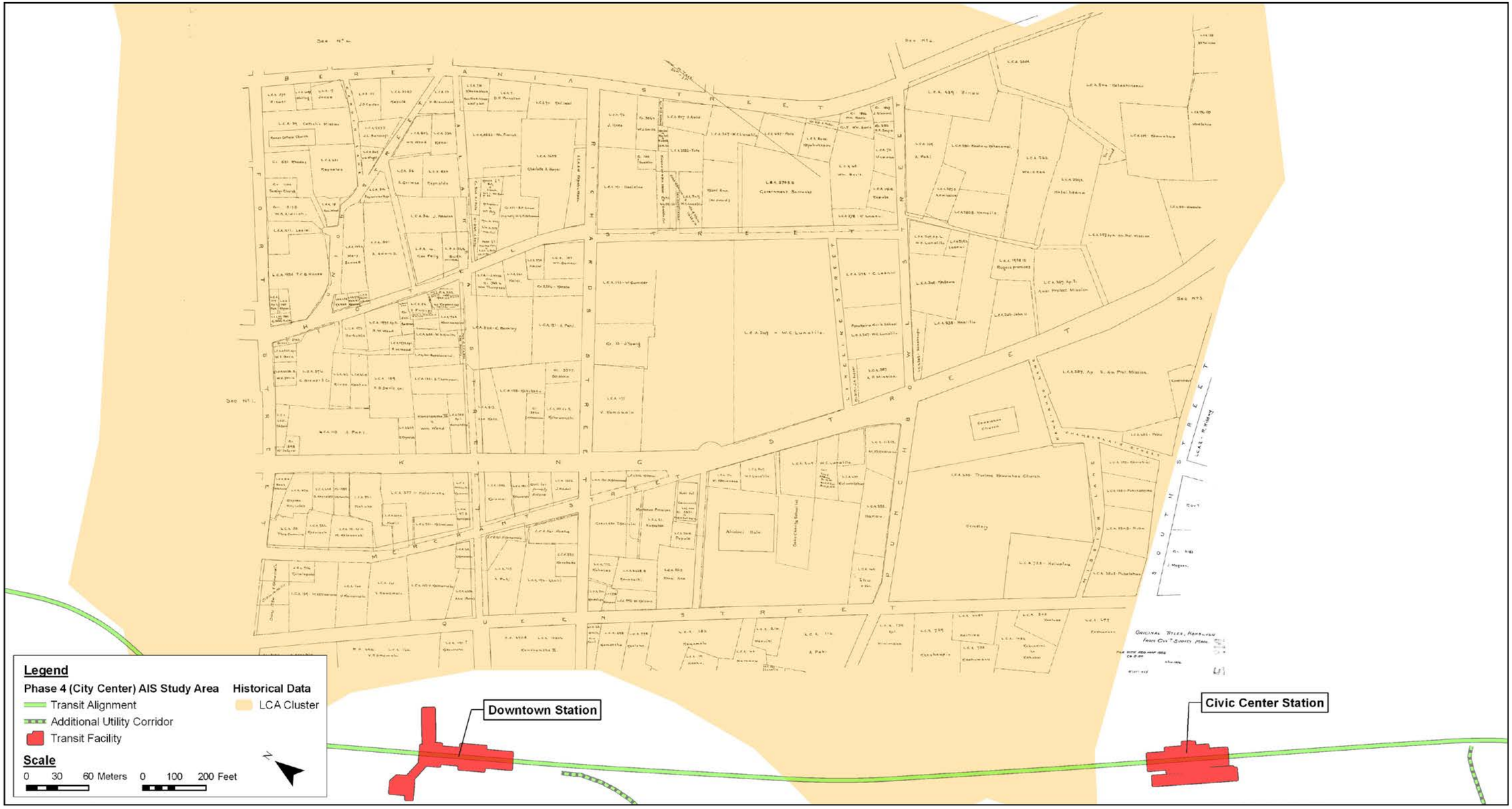

Figure 68. This 1891 S. E. Bishop survey map (Reg. Map 1556) shows LCAs within the Downtown Honolulu area. The majority of awards went to Hawaiian royalty, *ali‘i*, Westerners, companies such as C. Brewer & Co., or missionary establishments.

along the stream flats, scattered house sites, and *kula* lands increasing towards the valley edges away from the stream, approximates that found within Kalihi and Nu‘uanu Ahupua‘a.

The lower portion of Pauoa Ahupua‘a, from Punchbowl down to the shore, included the area of present-day Honolulu. At the time of Western contact, this shoreline area to the east of Nu‘uanu Stream was known as the settlement of Kou, which consisted of house sites, agricultural fields, gaming areas for the chiefs, part of Māmala Bay with its famous surf, and the protected shallow bay of Kuloloia. With the discovery of Honolulu Harbor in 1793 by Captain William Brown, the area of Kou evolved rapidly into a bustling port town and eventual capital city of the island. This rapid change was reflected in the Māhele records within the lower coastal plains of Pauoa Ahupua‘a and the vicinity of the transit corridor. Figure 67 and Figure 68 show a majority of LCAs awarded to Westerners, royalty, *ali‘i*, missionary establishments and businesses. The LCAs located nearest to the project corridor documented a concentrated area of house lots (see Figure 24, Figure 38, Figure 46, Table 4, and Volume III). The traditional settlement pattern of the Pauoa shoreline, however, would have included the cluster of houses associated with the settlement of Kou, along with likely scattered *lo‘i* and *kula* lands nearing the sandy coastline, and small fishponds and salt pans. No large fishponds were documented within this stretch of coastline.

3.5 Makiki

Makiki Ahupua‘a consisted of several small, narrow valleys descending from the area of Pu‘u ‘Ōhi‘a (Tantalus) and opening out onto the flat coastal plain adjacent to (east of) Punchbowl Crater (Figure 69). Two intermittent streams, Kanaha and Makiki Streams, flowed from the valleys to the coast, with Makiki Stream being fed by several smaller streams in the upper valleys and eventually veering east into the neighboring *ahupua‘a* of Mānoa. Kanaha Stream continued across the lower plains of Makiki, meandering through the swampy coastal lands before emptying into the ocean *makai* of the Kaka‘ako Transit Station.

The settlement pattern within Makiki Ahupua‘a differed significantly from the settlement patterns displayed within the previously discussed *ahupua’a*. Unlike the other *ahupua‘a*, Makiki did not contain a perennial stream providing abundant water to the coastal plains. Consequently, the central coastal plains were relatively dry and not extensively cultivated with wetland taro. As observed during a hiking excursion by the botanist, Dr. Franz Julius Ferdinand Meyen, in 1831:

> The flat valley of Honolulu through which we hiked on the excursion as well as the entire slope of Puowaina [Punchbowl] and the ridge which we had just climbed were completely barren up to an elevation of 600 to 700 feet-covered only by low herbage scorched by the sun... On our way we also saw a little piece of land which was covered with dry taro. (Pultz 1981:39-43)

LCA records and previous archaeological investigations indicate that wetland taro, scattered houses, and *kula* lands were instead concentrated primarily within the narrow upper valleys with feeder streams (along Kānealole, Moleka, and Maunalaha Streams), narrowly along portions of Makiki Stream, and within the swampy coastline (see Figure 69, Figure 70, Figure 71) (Yent and Ota 1980). The inland slopes of Makiki, including Punchbowl Crater, were also widely known for the growing of sweet potatoes. As described by E.S. Craighill Handy, “The cinder slopes of what are now called Round Top and Makiki Heights did not support taro, but have always been famous for sweet potatoes” (1940:78).

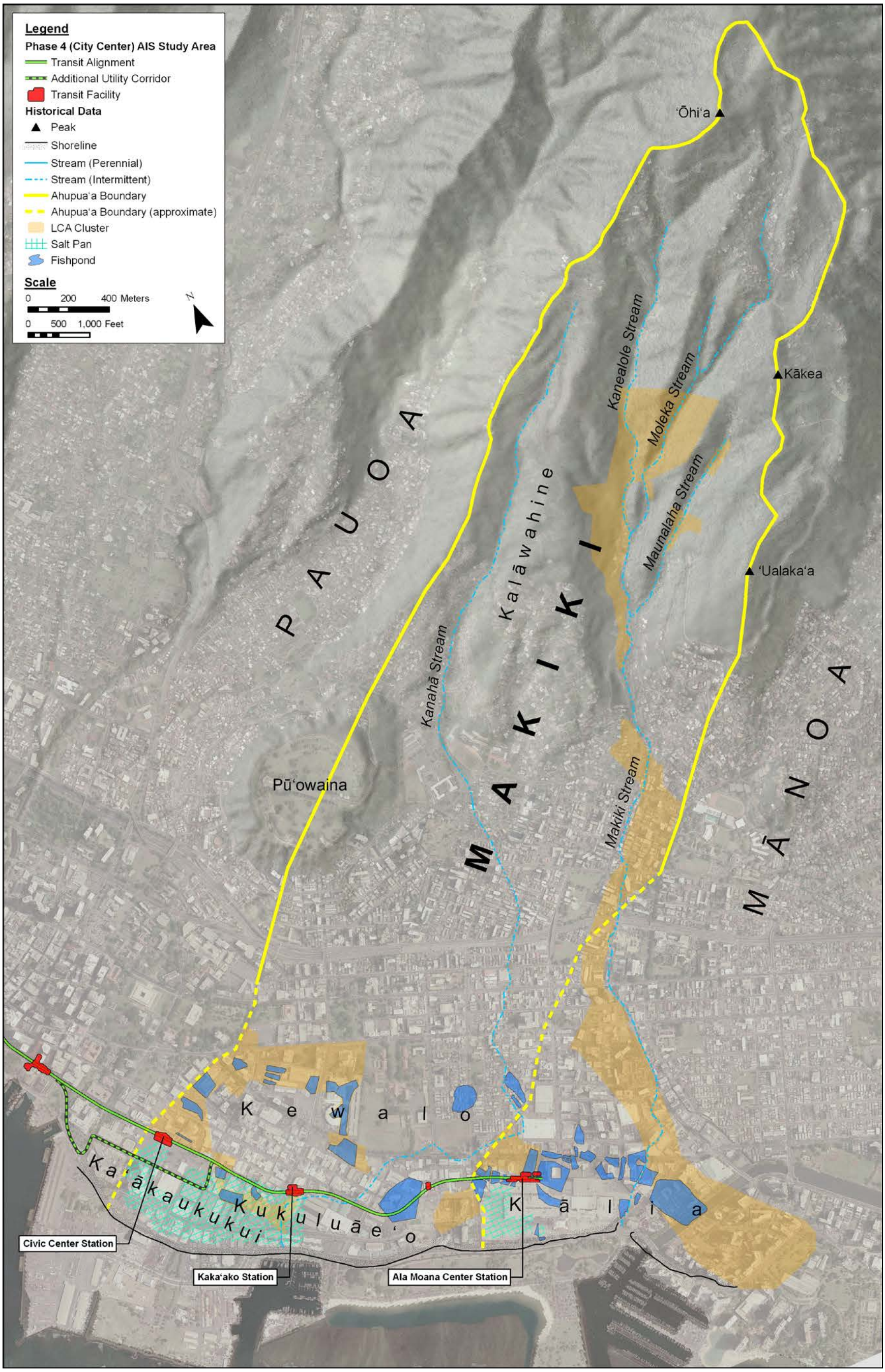

Figure 69. Aerial photograph showing Makiki Ahupua‘a, including: the *ahupua‘a* boundaries, several intermittent streams, several scattered clusters of LCAs, numerous fishponds within the lower coastal plain, and an extensive area of salt pans (Source: U.S. Geological Survey 2005)

The coastal area, below the present-day King Street, consisted of extensive swamp lands utilized for fishponds and salt pans along with occasional taro *lo‘i* and habitation (see Figure 39, Figure 42, and Figure 71).

Māhele awards in this area described significant tracts of salt lands, particularly within the larger LCAs (for example, LCAs 7713, 387, and 10605). The extent of salt cultivation may have significantly increased during the post-Contact period; however, the importance of salt cultivation in the pre-Contact period was consistently described and mapped by early Western arrivals (see Section 2.4). The numerous fishponds within the marshy coastal area are shown in Figure 71 and supported by documentation of LCAs within the vicinity of the project corridor (see Table 4 and Vol. III). In addition, occasional taro *lo‘i* and habitation sites are also documented.

3.6 Kālia

The coastal lands of Kewalo and Kukuluāeʻo appear to have always been sparsely populated compared to the lands that would become Honolulu to the West, and the lands of Kālia and the rest of Waikīkī to the southeast (see Figure 71). Settlement in Kālia (extending as far west as the former *makai* end of Sheridan Street, which is modern Pi‘ikoi Street) was largely focused east of the former Pi‘inaio Stream (the eastern, *mauka/makai* portion of Ala Moana Boulevard), located approximately 800 m east of the east end of the Transit Alignment, but there was a hamlet in the Sheridan Street area near the eastern terminus of the transit project. It appears that Sheridan Street was built on an area of higher ground above the prevailing marsh lands that had been previously used for residence (and, as we now know, also for burial in some areas – see Section 4.4). Data from LCA records (see Table 5) document fish ponds including, in particular, “fry ponds” (*ki‘o pua*), taro patch (*lo‘i kalo*), house lots, and pasture (*kula* land).

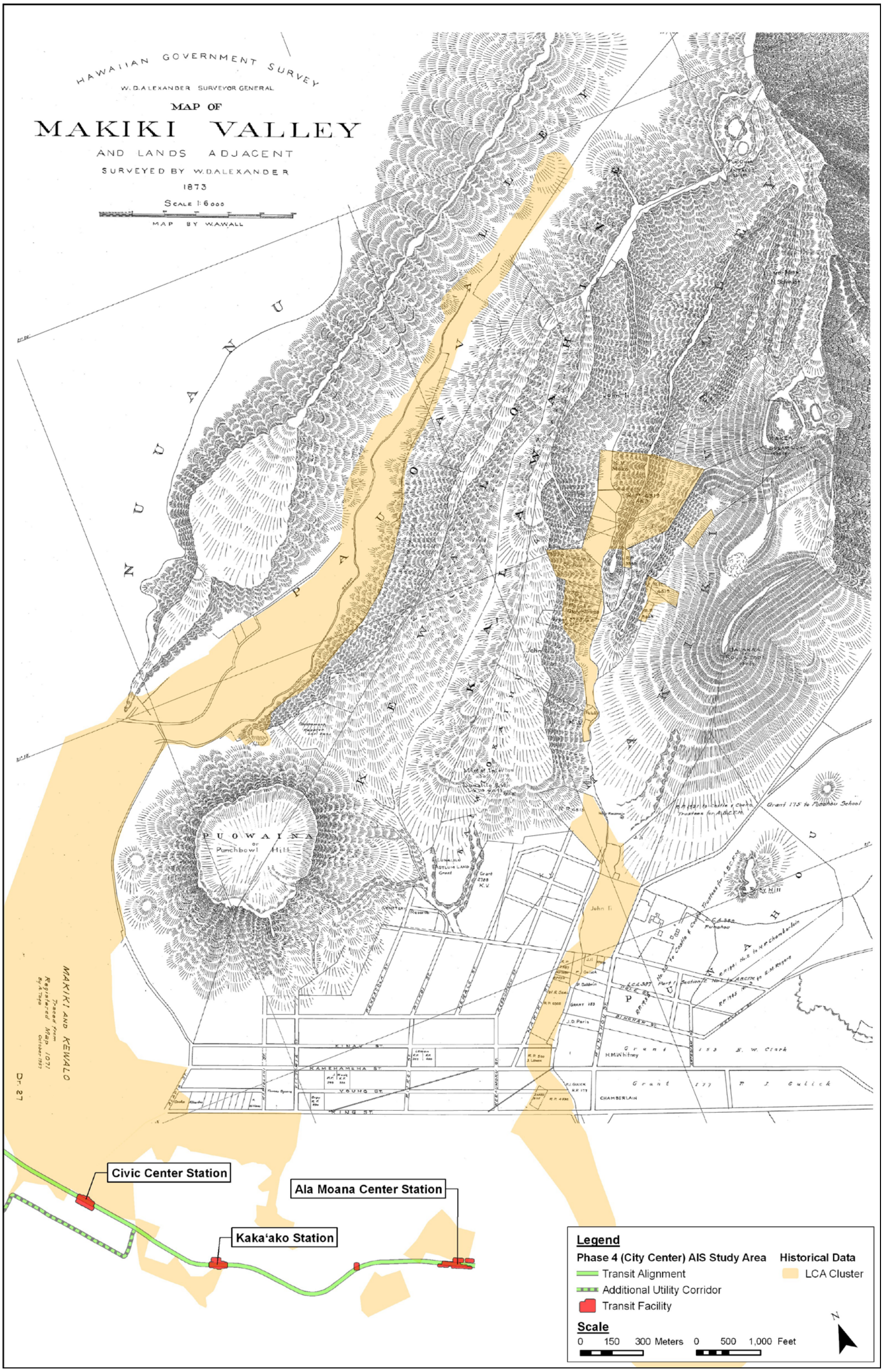

Figure 70. 1873 W. D. Alexander survey map (Reg. Map 1071) showing narrow LCA clusters along Kanealole, Moleka, Maunalaha, and Makiki Streams, as well as a lack of LCA claims in the plains just east of Punchbowl Crater

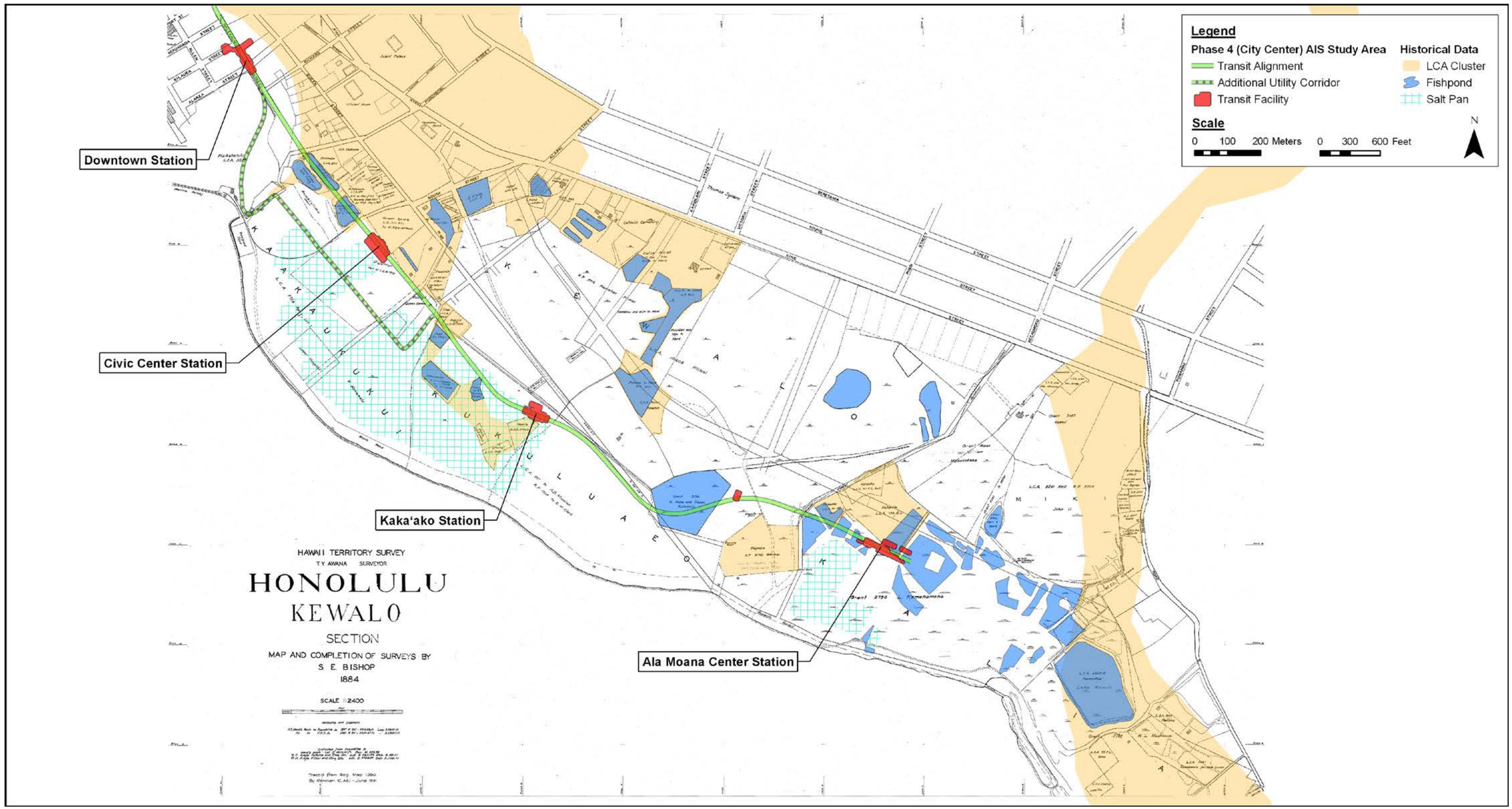

Figure 71. 1884 T. Y. Awana survey map (Reg. Map 1090) showing the coastal area of Makiki Ahupua‘a, in the present-day Kaka‘ako area, including: wide swamp lands below King Street, numerous fishponds, extensive coastal salt pans, scattered Māhele awards, and clusters of *kuleana* extending eastward from Downtown Honolulu